

OPERATOR CERTIFICATION BASIC MATH SHEET

DO NOT WRITE ON MATH SHEET

◆ Equivalents ◆

1 cubic foot = 7.48 gallons
1 cubic yard = 27 cubic feet
1 gallon of water = 8.34 pounds
1 p.s.i. = 2.31 feet of water
1 foot of head = 0.43 p.s.i.
1 horsepower = 0.746 kilowatts
1 acre = 43,560 square feet
1 mile = 5,280 feet

1 day = 1440 minutes

1 mg/L = 1 ppm

1 MGD = 694 gpm

π (Pi) = 3.14

Radius of circle = diameter \div 2

Circumference of circle = π x diameter

Temp. °Centigrade = (°Fahrenheit - 32°) x 0.55

Temp. °Fahrenheit = (°Centigrade x 1.8) + 32°F

◆ Area and Volume Formulas ◆

Circles/Cylinders:

Area, sq. ft. = π x radius, ft. x radius, ft.

Volume, cu. ft. = π x radius, ft. x radius, ft. x height, ft.

Rectangles:

Area, sq. ft. = length, ft. x width, ft.

Volume, cu. ft. = length, ft. x width, ft. x height, ft.

◆ General Formulas ◆

Detention Time, hr. = $\frac{\text{volume, gal.} \times 24 \text{ hr./day}}{\text{flow, gpd}}$

Velocity, ft./sec. = $\frac{\text{distance, ft.}}{\text{time, sec.}}$

Velocity, ft./sec. = $\frac{\text{gpm}}{\text{diameter, in.} \times \text{diameter, in.} \times 2.448}$
(Pipe)

Day's Supply = $\frac{\text{total chemical in inventory, lbs.}}{\text{average use, lbs./day}}$

Mean or Average = $\frac{\text{sum of values or measurements}}{\text{number of values or measurements}}$

Filter Backwash Rate, = $\frac{\text{backwash flow rate, gpm}}{\text{filter surface area, sq.ft.}}$
gpm/sq.ft.

Pond Area, acres = $\frac{\text{avg. width, ft.} \times \text{avg. length, ft.}}{43,560 \text{ sq. ft./acre}}$

Pond, Population Loading, = $\frac{\text{population served, persons}}{\text{number of persons/acre}} \times \text{pond area, acres}$

Dose, mg/L = $\frac{\text{chemical feed, lbs./day}}{\text{flow, MGD} \times 8.34 \text{ lbs./gal.}}$

Chemical Feed, lbs./day = flow, MGD x dose, mg/L x 8.34 lbs./gal.

Chemical Feed, lbs. = volume, MG x dose, mg/L x 8.34 lbs./gal.

Solids Applied, lbs./day = flow, MGD x conc., mg/L x 8.34 lbs./gal.

% Stroke Setting = $\frac{\text{required feed, gpd}}{\text{maximum feed, gpd}} \times 100$

% Removal = $\frac{(\text{in} - \text{out})}{\text{in}} \times 100$

Screening Removed = $\frac{\text{screenings, cu. ft.}}{\text{flow, MGD}}$

\$ Cost Per Day = hp x 0.746 x \$ rate x hours/day

Median = middle value of a group of data

Filtration Rate, = $\frac{\text{flow rate, gpm}}{\text{filter surface area, sq. ft.}}$
gpm/sq.ft.

Weir Overflow Rate, gpd/ft. = $\frac{\text{flow rate, gpd}}{\text{weir length, ft.}}$

Flow, gpm = $\frac{\text{volume, gallons}}{\text{time, minutes}}$

Dose, mg/L = $\frac{\text{chemical feed, lbs.}}{\text{volume, MG} \times 8.34 \text{ lbs./gal.}}$

◆ Chlorine Formulas ◆

Chlorine Dose, mg/L = chlorine demand, mg/L + chlorine residual, mg/L

Chlorine Residual, mg/L = chlorine dose, mg/L - chlorine demand, mg/L

Chlorine Demand, mg/L = chlorine dose, mg/L - chlorine residual, mg/L

Pounds/Day of HTH = $\frac{\text{lbs./day chlorine needed}}{\% \text{ chlorine of HTH}}$

Slope = $\frac{\text{fall, ft.}}{\text{length, ft.}}$

